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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/162,992	09/30/1998	TADASHI SENOO	P98-1703	9466
29175	7590	08/10/2009		
K&L Gates LLP P. O. BOX 1135 CHICAGO, IL 60690			EXAMINER DOVE, TRACY MAE	
			ART UNIT	PAPER NUMBER
			1795	
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			08/10/2009 ELECTRONIC	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

chicago.patents@klgates.com

# Office Action Summary

Application No.

09/162,992

Applicant(s)

SENOO ET AL.

Examiner

TRACY DOVE

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 26-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date: \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

This Office Action is in response to the communication filed on 5/11/09.

Applicant's arguments have been considered, but are not persuasive. Claims 26-37 are pending. This Action is FINAL, as necessitated by amendment.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 35 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a solvent comprising propylene carbonate, ethylene carbonate and  $\gamma$ -butyrolactone, does not reasonably provide enablement for a solvent comprising propylene carbonate, ethylene carbonate and methyl ethyl carbonate and/or dimethyl carbonate (see page 13 of the present specification). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 37 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites not less than 35 mol%, which includes

values greater than 75 mol% (see claim 26). Examiner suggests "wherein a content of propylene carbonate ranges from 35 mol% to 75 mol%".

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacFadden, US 5,772,934 in view of Ozaki et al., US 5,522,127.

MacFadden teaches a lithium polymer battery comprising composite electrolyte-electrode sheets formed on current collectors that are then coated with solid polymer electrolyte (separate solid polymer electrolyte layer) prior to battery assembly (abstract). The SPE is located both internally and at the surface of the electrode structure (3:31-40). One or both of the electrodes of the battery can be further coated with additional SPE to provide an electrical insulator between electrodes of opposite polarity (5:27-40). The battery includes a cathode including a lithium transition metal compound (3:66-4:8), an anode preferably including finely ground graphite (4:9-15) and a solid polymer electrolyte (SPE) including a salt, a polymer and liquid. The electrolyte may include polyacrylonitrile (PAN) as the polymer,  $\text{LiPF}_6$  as the salt and a mixture of ethylene carbonate and propylene carbonate in a ratio of 70:30 to 30:70 as the liquid (5:11-20). The anode and the cathode include a current collector (3:45-48). The anode has a thickness of at least 2-50 mils (4:36) and contains a binder such as butadiene or the like

(4:16-25). The polymer is in an amount of 10-20 wt%, the liquid is in an amount of 65-75 wt% and the salt is in an amount of 5-12 wt% based on the SPE total weight (5:21-25). Example 2 has a specific teaching of 14 wt%  $\text{LiPF}_6$  salt, 11 wt% PAN and 75 wt% of ethylene carbonate/propylene carbonate. Other liquids suitable for use as the solvent include dimethyl carbonate, diethyl carbonate and  $\gamma$ -butyrolactone (2:21-28).

MacFadden does not explicitly teach a graphite material having a specific surface area that ranges from 0.1-3.6  $\text{m}^2/\text{g}$  obtained from meso-carbon micro beads.

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10  $\mu\text{m}$ , preferably 5-7  $\mu\text{m}$  (6:35-43). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0  $\text{m}^2/\text{g}$ , preferably 2.5 to 5.0  $\text{m}^2/\text{g}$  (6:50-58). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) to obtain a paste. A copper foil (current collector) of 0.02 mm thickness was coated with the paste of both surfaces. The concentration of  $\text{LiPF}_6$  with respect to the non-aqueous solvent is 1 mol/l ( $\text{mol}/\text{cm}^3$ ) (4:55-58).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode

of MacFadden. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). MacFadden teaches the negative electrode may be a carbonaceous material, preferably graphite, capable of intercalating lithium. Both Ozaki and MacFadden teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of MacFadden because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

While MacFadden does not explicitly state the number average molecular weight of the PAN, this limitation is considered obvious in view of the teaching by MacFadden that PAN may be used as the polymer of the SPE.

\*

Claims 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi, EP 0724305 in view of Ozaki et al., US 5,522,127.

Akashi teaches a gel electrolyte and a lithium secondary cell using the gel electrolyte. The cell includes a positive electrode which may be a lithium/transition metal composite oxide, a negative electrode which may be a carbonaceous material such as graphite and the gel electrolyte (5:8:16). The non-aqueous solvent and the electrolyte salt used for the production of the gel electrolyte may be those generally used for the production of a lithium secondary cell. The solvent may preferably be

ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyl lactone or mixtures thereof. The preferred salt is  $\text{LiPF}_6$ . A mixture containing EC and PC in combination is preferred (4:1-12). The gel electrolyte further includes a polymer having a side chain to which at least one nitrile group is bonded. The polymer is preferably polyacrylonitrile (PAN) and has a number-average molecular weight ranging from about 50,000 to 500,000 (3:45-59). A molar ratio of a monomer as a repeating unit of the PAN to the non-aqueous solvent is suitably in the range of 5:95 to 30:70 though it varies depending upon kinds of the non-aqueous solvent, the gelling agent and the electrolyte salt used. The lithium salt may be in a concentration of 0.4 to 2 M (4:13-17; 31-32). Tables 1 & 2 teach a gel electrolyte including PAN, EC and PC where PC is 10-38 mol% of the gel electrolyte.

Akashi does not specifically teach the negative electrode of claim 26. Akashi teaches lithium secondary cells are well known to have a negative electrode made of a material such as lithium, a lithium alloy or a carbonaceous material capable of occluding lithium (2:12-17). Akashi further teaches examples of suitable negative electrode activating ingredients may include lithium, a lithium alloy and a carbonaceous material capable of occluding lithium, such as graphite (5:12-16).

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10  $\mu\text{m}$ , preferably

5-7  $\mu\text{m}$  (6:35-43). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0  $\text{m}^2/\text{g}$ , preferably 2.5 to 5.0  $\text{m}^2/\text{g}$  (5:50-58). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) to obtain a paste. A copper foil (current collector) of 0.02 mm thickness was coated with the paste of both surfaces.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of Akashi. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (3:12-14). Akashi teaches the negative electrode may be a carbonaceous material such as graphite that is capable of occluding lithium (intercalating). Both Ozaki and Akashi teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (4:54-58 of Ozaki). One of skill would have been motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of Akashi because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

### ***Response to Arguments***

Applicant's arguments filed 5/11/09 have been fully considered but they are not persuasive. Note evidence of unexpected results must distinguish the claimed invention over the prior art of record. Akashi teaches the claimed percentage of propylene



carbonate in the electrolyte solvent and Ozaki teaches the claimed negative electrode material. Applicant has not addressed the Examiner's motivation for combining MacFadden and Ozaki or Akashi and Ozaki nor has Applicant shown the claimed negative electrode material has unexpected properties over the negative electrode material disclosed by Ozaki. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Examiner points out that the section of Ozaki cited by Applicant as assertedly teaching away from the claimed invention (col. 2, lines 3-6) is part of the background section of Ozaki. Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (1:8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (3:1-7). The average particle diameter of the graphite particles is in the range of 3-10  $\mu\text{m}$ , preferably 5-7  $\mu\text{m}$  (6:35-43). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0  $\text{m}^2/\text{g}$ , preferably 2.5 to 5.0  $\text{m}^2/\text{g}$  (5:50-58). Thus, Applicant's arguments are not persuasive.

Applicant again argues Ozaki suggests that propylene carbonate is disfavored. This argument has been addressed by the Board of Patent Appeals (and the Examiner) and has been determined to be non-persuasive.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday & Thursday (9:00-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

August 4, 2009

/TRACY DOVE/

Primary Examiner, Art Unit 1795